



Draft
Site Visit Report
Coalbed Methane Landowners and
Environmental Impacts
Gillette, WY

Prepared for:

U.S. Environmental Protection Agency

Engineering and Analysis Division
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1.0 PLACES AND DATES

Swartz Ranch	August 8, 2001
Sorenson Ranch	August 8, 2001
Phil Hoy Property	August 8, 2001

2.0 ATTENDEES

US EPA

James Covington, OW/OST/EAD
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3.0 OBJECTIVE

EPA is in the process of gathering data to develop a “Best Professional Judgment” determination of effluent limitations that represent Best Available Technology Economically Achievable (BAT) for coalbed methane (CBM) activities in Region 8 (i.e., Wyoming, Montana, Colorado, Utah, North Dakota, South Dakota). EPA and contractor personnel conducted site visits to landowners that have CBM wells on their property and to other landowners that have been negatively impacted by CBM operations as part of this data-gathering effort. The purpose of the visit was to gather information on the environmental impacts of coalbed methane operations in the Powder River Basin. The Powder River Basin Resource Council selected these sites for visiting.

4.0 COALBED METHANE OPERATIONS

During the one-half day site visit, 3 separate locations were visited. Each of these locations is described below.

4.1 Swartz Ranch

Mr. Swartz is a third generation rancher near Gillette, Wyoming. He typically raises 350 head of cattle on 15,000 acres, 12,000 of which are deeded. Currently, Mr. Schwartz is raising 260 head of cattle due to drought and loss of feed. He runs a cow/calf operation and sells off his calves every year. Over the years, Mr. Swartz has invested approximately \$100,000 to construct livestock watering stations for his cattle. He also maintains 285 acres of meadows where he grows alfalfa and other forage crops. Currently, 120 acres are producing alfalfa. Figure 1 shows a picture of Mr. Swartz holding some of his alfalfa. Mr. Schwartz uses flood irrigation when water is available to irrigate his meadows. He is currently not using this technique due to the detrimental effects of coal bed methane produced water on his fields. Mr. Swartz believes his alfalfa grows well because the long roots of the alfalfa plants are able to tap into a shallow aquifer that runs below the meadows. This aquifer is recharged in part from Wildcat Creek that runs through Mr. Swartz's property. Figure 2 shows a picture of Wildcat Creek. Wildcat Creek eventually flows into Horse Creek.



Figure 1: Alfalfa Meadows at Swartz Ranch



Figure 2: Wildcat Creek at Swartz Ranch

Redstone Resources Inc. operates a number of CBM wells upstream from Mr. Swartz's ranch. Mr. Swartz stated that he was not notified of Redstone's original permit (WY0036374) to discharge that was issued on July 1, 1996. In the state of Wyoming, public notices for permits are required to be published in the newspaper. The notices are published in the Casper newspaper but may not be printed in the local newspaper. Mr. Swartz stated that he does not have many opportunities to read the Casper paper, and when he does, the paper is a few days old. Because of actions taken by the Powder River Basin Resource Council, Mr. Swartz is now on the mailing list to receive CBM information. In addition to the surface discharge of the produced water into Wildcat Creek, Mr. Swartz stated that some of the water is managed in multiple "on channel" reservoirs which prevents natural water from reaching his property. Mr. Swartz has water rights to Wildcat Creek that have been disrupted by the coalbed methane operations.

Over the past two years Mr. Swartz believes that Wildcat Creek has changed significantly. Native vegetation in and around the creek bed has died, the sides of the creek bed have changed due to erosion and/or slumping, and different species of vegetation such as slew grass and cat tails are becoming more prominent in the creek bed. Figure 3 shows a picture of the influx of slew grass in creeks with CBM discharges in the Gillette area. Mr. Swartz believes these changes are caused by the discharge of CBM produced water upstream from his property. The CBM water only flows through his property during the winter months when the ground is frozen and the rate of infiltration is lower. Before the CBM wells were installed Mr. Swartz stated that Wildcat Creek would flow one to two months during the spring and contribute to the recharge of the shallow aquifer below his

meadows. Now, with the CBM discharges to the creek the water flows for five to six months including winter months when the ground is frozen. The increased water flow, the high salinity of the produced water, and influx of water during months when the creek is typically dry has killed most of the native grasses that typically grow in the creek bed during the spring and summer months. Figure 4 shows a picture of the current creek bed. Mr. Swartz stated that he relies on the vegetation in the creek bed to feed his cattle during the winter months. The salt tolerant slew grasses that have replaced the other grasses in the creek bed are not palatable and therefore not eaten by his cattle. This loss of feed has required Mr. Swartz to increase the amount of supplemental feed that he purchases to feed his cattle. Mr. Swartz is extremely concerned that the CBM water will contribute to the recharge of the shallow aquifers below his meadows and increase the salinity of the water. The alfalfa that Mr. Swartz grows is a salt sensitive plant and an increase in the salinity of the water below the meadows may kill his crops. Mr. Swartz believes that, according to the Montana Department of Environmental Quality, the water discharged from each CBM well during a year contains up to 20 tons of salt. Without the forage crops from his meadows, Mr. Swartz does not believe his ranch will survive. He is able to grow a ton of hay/alfalfa for approximately \$20 per ton. Due to the drought in Wyoming and surrounding areas for the past several years, the cost of hay is up to \$100 per ton. Mr. Swartz indicated that he needs approximately 500 tons of hay per year to feed his cattle.



Figure 3: Slew Grass



Figure 4: Close-Up of Wildcat Creek at Swartz Ranch

Since CBM discharges have occurred to Wildcat creek, Mr. Swartz has hired a lawyer to deal with his loss of water rights and vegetation. In addition, Mr. Swartz has hired geologists, hydrogeologists, and soil scientists to evaluate the impacts of CBM water on his property and alfalfa crops. Mr. Swartz stated that representatives of Redstone Gas approached him once to “settle” his grievances but they have not made any offer to compensate him for damages to his property. Mr. Swartz wants to be able to farm his land like he has in the past and to ensure the productivity of his land so that he can hand it over to his son.

4.2 Sorenson Ranch

The Sorenson Ranch consists of approximately 12,000 acres that are owned, leased, or shared. The Sorenson’s raise about 250 head of cattle as part of their cow/calf operation and sell the calves each year. Some hay is grown for forage but most of the land is grazing land for the cattle. Prima Gas operates numerous CBM wells on the ranch. Mrs. Sorenson indicated that the CBM operators were helpful and forthcoming with respect to CBM well operations on the land that they own, but much less helpful with respect to CBM wells on their leased land. The Sorenson’s were not given the opportunity to review the water management plans for the wells on their leased land until the public comment period and in some cases Mrs. Sorenson believes they were not adequately informed of some of the CBM water discharges on this leased land.

A large number of the wells at this location were not working and in some instances aboveground water lines were installed and discharges were occurring at non-permitted outfalls. Mrs. Sorenson indicated that standing water from such discharges increases the leaching of salts from the soils to the surface which can kill vegetation. This non-permitted discharge had been occurring for a few days. Figure 5 shows a picture of one of the aboveground water lines from a CBM well with a progressive cavity pump. Figure 6 shows a picture of a non-permitted discharge from the aboveground water line. Figure 7 shows a picture of the standing water associated with the non-permitted discharge.



Figure 5: Aboveground CBM Water Line at Sorenson Ranch



Figure 6: Non-Permitted CBM Discharge at Sorenson Ranch



Figure 7: Standing CBM Water at Sorenson Ranch

At another location on the ranch, Mrs. Sorenson stated that CBM discharges a few months ago killed vegetation in a creek bed. She believes the sodium adsorption ratio (SAR) of the CBM produced water on her land is about 20. The discharges from the well on the Sorenson ranch have caused areas of dead vegetation on the ranch and on neighboring property. Figure 8 shows a picture of the area of dead vegetation downstream on neighboring property. The outfall is located at the bottom of the picture.



Figure 8: Dead Vegetation at Neighboring Ranch

Mrs. Sorenson stated that her cattle have benefitted from the increased number of livestock watering points. The increase in watering stations has allowed the cattle to graze in areas around

each watering station thereby allowing more land to be grazed during the summer months when water is scarce. Figure 9 shows a picture of a tire tank being used as a livestock watering point. Overflow from the tire tank is piped underground to a permitted discharge where the water flows down a concrete channel and over limestone rocks to precipitate the iron and minimize erosion. Figure 10 shows a picture of a permitted outfall at the Sorenson Ranch.



Figure 9: Tire Tank at Sorenson Ranch



Figure 10: Permitted Outfall at Sorenson Ranch

4.3 Hoy Property

Phil Hoy owns and manages a trailer park with 60 trailers and a welding shop on Hannum Road, north of Gillette, Wyoming. In 1997 Western Gas Resources began drilling CBM wells to the south and east of Mr. Hoy's property. The produced water from these wells is being discharged into the Little Rawhide Creek upstream from Mr. Hoy's property. To the north of Mr. Hoy's property is a coal mine. Mr. Hoy's property is located in a low topographic area.

During the last few years Mr. Hoy has experienced a number of problems that are believed to be a result of the nearby CBM and coal mining operations. In 1999, Mr. Hoy installed a new leach field on his property due to the failure of an existing field that was installed in 1985. The old field became filled with water and could no longer accept effluent. When the old leach field was installed, groundwater was encountered at a depth of 17 feet. In 2000, the depth to groundwater in this area was measured at 31 inches. Due to the high groundwater level, Mr. Hoy had to install his new leach field in higher ground further away from the trailer park. The rising groundwater level is believed to be caused from the discharge of CBM water into the Little Rawhide Creek drainage which flows through Mr. Hoy's property. The excess water in the drainage has infiltrated the shallow sands that under-lie Mr. Hoy's property. Figure 11 shows a picture of the Little Rawhide Creek drainage area just across the street from Mr. Hoy's property.



Figure 11: Little Rawhide Creek at Hoy Property

More recently, Mr. Hoy's drinking water well went dry. Apparently a number of houses downstream of Western Gas's CBM operations have also lost their drinking water wells. Most of these wells were replaced by the CBM operator. Mr. Hoy's well was not initially covered by the CBM operator because they claimed the impact was from the coal mining operation. By working with the DEQ Office of Surface Mining, Mr. Hoy reached a settlement to replace his drinking water well. Both the coal mining and CBM operators contributed to the settlement for the drinking water well. Although the well installation was eventually paid for, Mr. Hoy has incurred increased energy, equipment, and maintenance costs to pump the water from the well because it is significantly deeper than the previous well.

In addition, Mr. Hoy has experienced damage to his home in terms of separation cracks on the roof and wrinkling and warping of the skirting around the underneath portion of the home. These damages coincide with recent movement (settling) of his dwelling. Mr. Hoy has also had to re-engineer his overhead crane and doors in his welding shop due to the decreasing stability of the ground. It is believed that the increased level of groundwater in the subsurface has impacted the shallow sands and silts thus creating unstable conditions and causing structural problems, especially during blasting events at the coal mine that can be felt several miles away. Mr. Hoy has also observed increased amounts of standing water on his property which has caused salt to leach to the surface. Figure 12 shows a picture of the ground where salt has leached to the surface of Mr. Hoy's property.



Figure 12: Evidence of Salt Leaching at Hoy Property

Mr. Hoy has filed a law suit against the CBM operators to recuperate his costs for the new leach field and other damage. He is uncertain as to whether he can recoup enough money to pay for the well field and the lawyers, geologist, and hydrogeologist that he hired to document the impacts to his property.

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